House prices in Spain

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1. INTRODUCTION

Housing is the main asset of most households both in Spain and in many other developed countries. It is also the security for a significant part of the loans granted by Spanish deposit institutions. Consequently, through their effects on household consumption and investment decisions and on the financial position of households and financial institutions, changes in house prices have potential implications for the macroeconomic and financial stability of the Spanish economy.
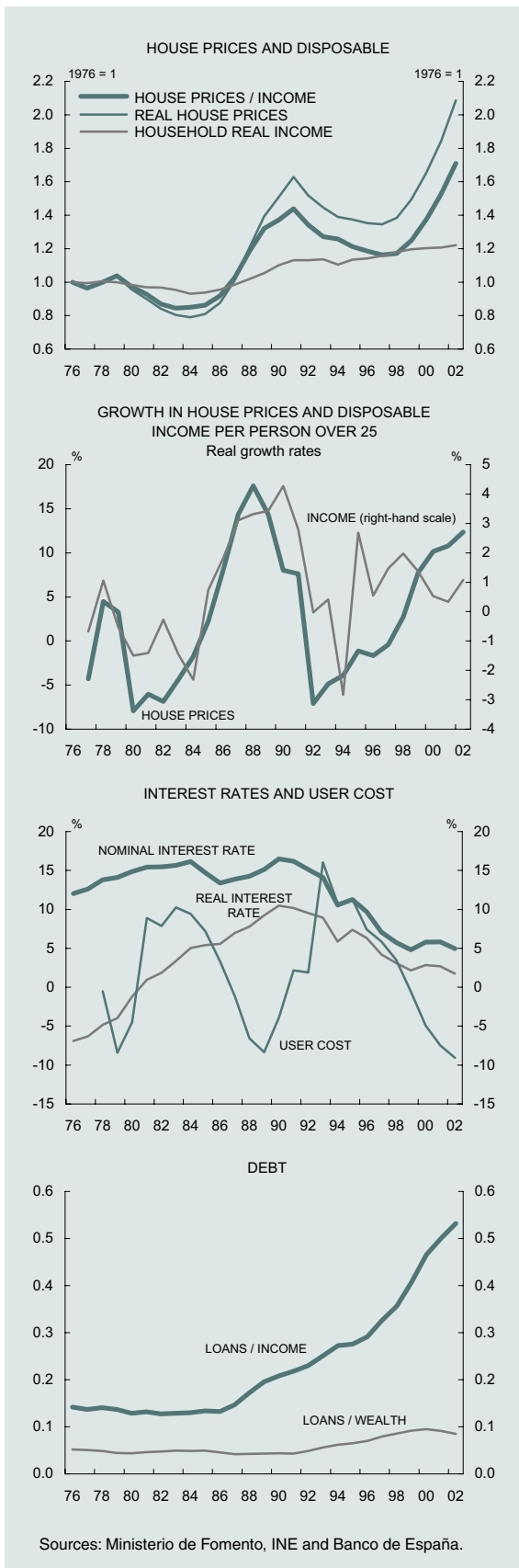
Real house prices in Spain have doubled over the last 25 years. As a proportion of average household income they have increased significantly, being among the highest in the developed countries. Between 1997 and 2002, the average price of appraised housing in Spain rose by 78%, and the latest official information for 2003 Q1 (an annual rate of increase of 17.5%) shows no sign of moderation in this growth, despite the economic downturn. However, it should be pointed out that GDP and employment continue to grow at positive rates (unlike, for example, in most of the euro area), that expectations regarding the continuation of this process are favourable, while interest rates on mortgage loans are holding at what are, in historical terms, notably low levels.

These circumstances would seem to warrant asking how the recent behaviour of the price of housing in Spain relates to that of its basic determinants. Given the special characteristics of this real asset, which combines the properties of a consumer durable with those of an investment asset, there are a number of possible approaches to this analysis. This article summarises the results of two recent studies in this area carried out by the Research Department of the Banco de España, which take different approaches.

Following this introduction, Section 2 summarises the results of the analysis of house prices in Spain carried out in Martínez and Maza (2003), which basically explores the nature of housing as a consumer durable. Under this approach (referred to below as the macroeconomic approach), the price of this real asset is essentially related to macroeconomic variables such as household disposable income and the cost of mortgage finance. Section 3 summarises the results of the alternative approach of Ayuso and Restoy (2003), which focuses on the

CHART 1

House prices and their determinants in Spain

HOUSE PRICES AND DISPOSABLE

1976 = 1

— HOUSE PRICES / INCOME
— REAL HOUSE PRICES
— HOUSEHOLD REAL INCOME

GROWTH IN HOUSE PRICES AND DISPOSABLE
INCOME PER PERSON OVER 25
Real growth rates

INCOME (right-hand scale)

HOUSE PRICES

INTEREST RATES AND USER COST

NOMINAL INTEREST RATE

REAL INTEREST
RATE

USER COST

DEBT

LOANS / INCOME

LOANS / WEALTH

Sources: Ministerio de Fomento, INE and Banco de España.

financial properties of the housing asset (financial approach), analysing by means of a general asset pricing model the theoretical relationship between their price and the "dividends" they offer, whether in the form of rents or accommodation services. The main conclusions of the article are presented in Section 4.

2. MACROECONOMIC APPROACH

The traditional analysis of house prices under this approach starts with an equation for the demand for housing derived from the theory of durable goods consumption (1). According to this theory, the demand of the representative consumer, in a particular period, depends basically on their income and the total cost of owning a house during such period. The latter, known as the "user cost", is equal, in the absence of capital market imperfections, to the opportunity cost (net of tax effects) of investment in housing, plus depreciation, less the expected change in house prices. The opportunity cost, in turn, depends on the investment and financing alternatives existing at any given moment. Demand will be higher the higher the average household disposable income and the lower the user cost. The latter will be lower the lower the cost of financing, the lower the returns on alternative investments and the larger the expected increase in house prices.

To estimate the theoretical price of housing, the demand equation is turned round, so that the price becomes the variable explained by the determinants mentioned above and the existing number of dwellings. Since the latter is endogenous, it is frequently replaced by variables that characterise the behaviour of supply in this market. In practice, demographic variables (to correct for the fact that the assumed representative consumer does not exist) and factors relating to the existence of credit restrictions are also included in the equations. In addition, the static equation is usually supplemented with dynamic terms which may appear as a consequence not only of the influence of future-price expectations on user cost, but also of the existence of adjustment costs in supply (possibly non-symmetric), of the so-called "psychological aversion to losses" of owners and of the effects of price changes interacting with credit restrictions. All this tends to give rise to significant inertia in house prices.

Before commenting on the results of the estimates, it is worth noting, as seen in Chart 1, that house prices in Spain deflated by the CPI, albeit with fluctuations, have shown a tendency to rise

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(1) See, for example, Muellbauer and Murphy (1997)

TABLE 1

Determinants of house prices in Spain
Dependent variable: growth rate of real house prices
Annual data for 1978 to 2002

	MODEL 1		MODEL 2	
Constant	-1.32	***	0.72	***
Growth rate of real house prices $_{t-1}$	0.66	***	0.59	***
Growth rate of real income $_t$	2.16	***	1.91	***
Change in the nominal interest rate $_t$			-1.30	*
Stock market returns $_t$ (from 1995)	-0.16	***	-0.14	**
Real house prices $_{t-1}$	-0.49	***	-0.19	***
Real household income $_{t-1}$	1.36	***	0.19 (a)	
Nominal interest rate $_{t-1}$			-0.86	***
STATISTICS (b):				
R^2	0.86		0.86	
s_e(*100)	3.23		3.25	
DW	2.41		2.61	
Q(4)(p-value)	(0.21)		(0.13)	
Cointegration test	-4.92		-4.04	
LONG-TERM ELASTICITIES:				
Real household income	2.78		1.00 (a)	
Interest rate			-4.50	

(a) Restricted parameter.
(b) s: standard deviation of the regression residual; DW: Durbin Watson statistic; Q(4): fourth order residual autocorrelation test; Cointegration test of Banerjee, Dolado and Mestre (1998), whose critical values at 5% are -3.64 and -3.91, so that the existence of cointegration between the variables in levels is not rejected.
Note: (*) Statistically significant variable at 10%. (**) Statistically significant variable at 5%. (***) Statistically significant variable at 1%.

over the last 25 years (2). At the same time, there has been a close relationship between house prices and household disposable income. The periods in which the former rose most in real terms (1978-79, 1986-91 and 1998-2000) coincide with periods of growth in the spending capacity of households. However, on one hand, this correlation has been less strong since the mid-1990s (in the latest stage of the cycle, the increase in real house prices started with some lag and continued during the 2001-2002 slowdown) and, on the other hand, it cannot by itself explain the trend in prices which, since the mid-1980s, have also tended to rise relative to average household disposable income. This suggests that there may have been a structural change in the long-term equilibrium relationship between house prices and household income.

The most likely explanation for such a structural change may be found in the progressive increase in the accessibility of bank loans, which is reflected by the ratio of housing credit to household disposable income (see Chart 1). Underlying this greater availability of credit to households for the purchase of housing is the

greater efficiency and competition in the Spanish banking system and, especially, the fall in nominal interest rates associated with the process of convergence of the Spanish economy and its entry into the euro area (3). However, in practice, it is difficult to identify the effect of this structural change, since the variables that might approximate it (such as the aforementioned credit-to-income ratio and the level of nominal interest rates) are highly correlated with disposable income (with sample correlation coefficients of 0.92 and 0.51, respectively). In addition, the credit-to-income ratio is strongly endogenous.
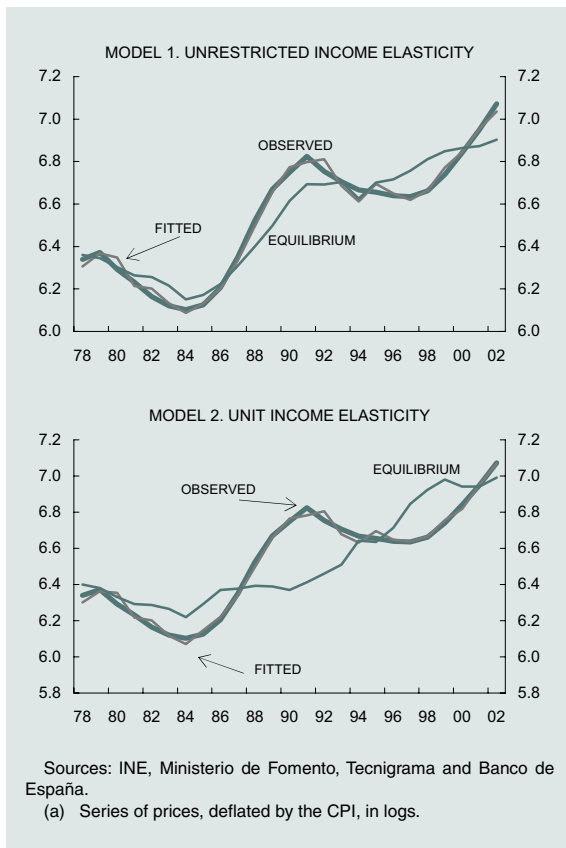
In fact, the problem of multi-collinearity between the variables and the strong inertia in house prices mean that it is difficult to obtain empirical specifications in which many of the variables mentioned above as being potential determinants of house prices are significant (4). Table 1 summarises some of the results of the

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(2) See Martínez and Maza (2003) for the details of construction of the variables used.

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(3) With no change in the level of real interest rates, a decline in inflation reduces the financial burden of credit during the initial years of its life. Since the initial financial burden is generally the main restriction on the granting of credit, this reduction helps to relax credit restrictions. This effect may be very important, as the example in Nickell (2002) shows.

(4) See also Bover (1992).

CHART 2

House prices in Spain (a)

MODEL 1. UNRESTRICTED INCOME ELASTICITY

OBSERVED

FITTED

EQUILIBRIUM

MODEL 2. UNIT INCOME ELASTICITY

EQUILIBRIUM

OBSERVED

FITTED

Sources: INE, Ministerio de Fomento, Tecnigrama and Banco de España.
(a)   Series of prices, deflated by the CPI, in logs.

estimates presented in Martínez and Maza (2003). Column 1 presents the results of estimation of the basic model. The rate of growth of house prices depends positively on the same rate of growth lagged by one period and on the increase in income and, negatively, on stock market returns from 1995 (when equity investment became more widespread among Spanish households) and on the deviations of the price of housing from its long-term equilibrium, determined exclusively by the path of income (5).

On the basis of statistical tests, the existence of a long-term equilibrium relationship between the level of house prices and household disposable income can be accepted, but the long-term elasticity of the former with respect to the latter is 2.8. Such a high value might be partly reflecting the effect of the relaxation of credit restrictions already referred to above. If this elasticity is restricted in the long term to a more theoretically plausible value of one, the

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(5)   Although the user cost is not significant in the estimates made, this may be partly because the lagged price growth variable already reflects a large part of the effect of the user cost through its influence on expectations of the future change in prices.

nominal interest rate (which would reflect both the effect of changes in the real interest rate on the user cost and the effect of the decline in the inflation rate on credit restrictions) is clearly significant (column 2), with a long-term semi-elasticity of –4.5, and the existence of a long-term relationship between price, income and the interest rate is maintained.

Given the difficulty of separating, on the basis of the sample information, the effects of changes in income and changes in credit restrictions, Chart 2 shows the results of estimating the equilibrium price of housing in Spain, in the short and long term, using the two models presented in Table 1. As can be seen, these two models offer a broadly similar view of the path of house prices. They have tended to fluctuate around their equilibrium value, normally moving towards it at a relatively slow speed. In fact, the recent upturn began with housing undervalued, as a result of excessive correction of the overvaluation in the late 1980s. Part of the growth since then can, therefore, be interpreted in terms of adjustment towards equilibrium levels which, during most of the 1990s, tended to be above the observed prices.

However, the increase in prices has now gone beyond merely closing this gap. On average in 2002, therefore, the real price of housing, according to these models, stood between 8% and 17% above its long-term equilibrium level. The estimated overvaluation is greater according to the model with no restriction on long-term income elasticity. That said, comparing the values observed with those corresponding to the short-term path of adjustment shows that the current situation is in line with what might be expected, given the characteristic inertia of this market and, in particular, the slow speed of adjustment towards equilibrium in past periods. This speed is higher in the unrestricted model, in which the distance to equilibrium is also greater.

3.   FINANCIAL APPROACH

As mentioned in the introduction, housing is the most important asset of most Spanish households. Seen from this perspective, its price, like that of any financial asset, should be related in some way to the flow of income that it provides to its owners. More specifically, the price should, in equilibrium, be equal to the discounted present value of the flow of present and future income. In the case, for example of a share, this income takes the form of dividends. In that of housing, it consists of either the rents received by the owner (when it is rented out) or else the accommodation services provided

(when it is occupied as a first or second home). In the literature, various authors (see, for example, Case and Shiller, 1988) have applied this approach (which is equivalent to that underlying, for example, the analysis of P/E ratios in the case of equities) to the study of property prices.
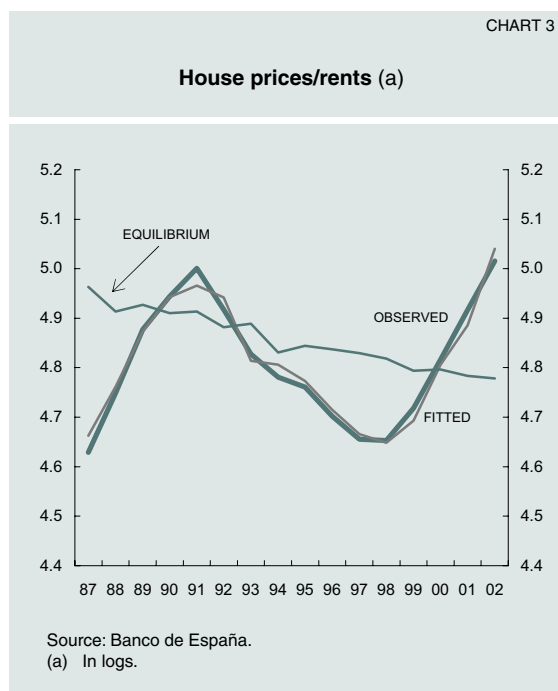
This approach is adopted by Ayuso and Restoy (2003) but, unlike the usual procedure in such studies, they allow the discount factor applied to future income to change over time, in accordance with the variables that determine the readiness of agents to substitute future for present consumption. More specifically, they use an asset pricing model (that is inter-temporal and stochastic), in which households decide how many goods (and other services) to consume and how many accommodation services to demand, in accordance with the prices thereof and their income. The latter may derive from employment or from their asset portfolio, which may include housing itself.

Logically, in equilibrium, the price of accommodation services must coincide with that of renting a dwelling, since any household can acquire such services by doing the latter. Also, it is demonstrated that the house price-to-rent ratio (the equivalent of the P/E ratio for shares) depends positively on expected future rents (or prices of accommodation services, in the case of owner-occupied housing) and negatively on the discount factor. This, in turn, varies in accordance with the expected growth of a consumption basket consisting of accommodation services and other goods and services, as well as a parameter measuring the inter-temporal elasticity of substitution of consumption (6).

Using the above theoretical relationship, it is possible to estimate the equilibrium value of the house price-to-rent ratio at any given moment. There are, however, two problems. First, neither the amount of the consumption-accommodation basket acquired nor its price are directly observable, information only being available on the amounts and prices corresponding to each of their components (rents and aggregate consumption). Second, household expectations regarding the future path of rents and consumption of the above-mentioned basket are not directly observable either.

The first of these problems is resolved by a number of transformations and approximations that enable the equilibrium relationship to be reformulated in terms of prices and amounts directly observable on the market. As for the sec-

CHART 3

House prices/rents (a)

Source: Banco de España.
(a) In logs.

ond, the paper follows an approach that is relatively standard in the literature, which involves estimating expectations on the basis of the projections of VAR (vector autoregression) models explicitly formulated to predict the future behaviour of the variables in question, on the basis of their own past and of that of other relevant macroeconomic variables (e.g. GDP growth and changes in wealth and interest rates).

The model estimation procedure also takes into account that, as under the macroeconomic approach, there may be temporary differences between the equilibrium and observed values. Consequently a short-term adjustment path is estimated along with the equilibrium values.

The empirical part of the paper considers three countries (the United States, the United Kingdom and Spain). The long-term equilibrium house price-to-rent ratios, and the (short-term) adjustment path towards them are estimated for these countries (7). In all three cases, the results of the estimation satisfy the usual goodness-of-fit requirements (8). Also, the presence in the equations of a coefficient with an economic interpretation (the inter-temporal substitution parameter) means that its estimated value can be compared with those obtained in other studies, which provides an additional check for the suita-

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(6)   Readers interested in the technical details of the model should refer to the original paper.

(7)   The period considered is 1987-2002. See the original paper for details of the specific series used in each case.

(8)   In particular, there are no symptoms of autocorrelation in the residuals and the so-called Sargan test validates the set of instruments used in the estimation.

bility of the approach taken. The estimated intertemporal substitution parameter is around 0.2 and 0.3 for the United States and Spain, and around 0.8 for the United Kingdom. In the first case, the estimates are in line with those obtained in other studies, while in the second they are towards the upper end of the scale.

Chart 3 shows, for Spain only, the estimated equilibrium ratios and adjustment path, as well as the related observed values. As can be seen, subject to the proviso that in this case the ratio depends not only on house prices but also on rents, Chart 3 tends to confirm the results obtained under the macroeconomic approach in the previous section.

In the first place, house prices in Spain (relative to rents) show signs of undervaluation in the first half of the 1990s, as a consequence of overreaction to the overvaluation that existed at the end of the 1980s. However, the gap began to be corrected between 1997 and 1998 and the consequent upward trend eventually led to the ratio exceeding its equilibrium value by around 20% at end-2002 (the end of the sample).

Despite this overvaluation relative to the long-term equilibrium levels, the values observed are close to the estimated adjustment path, as was the case under the approach of the previous section. Thus, the recent price movements are, according to the results of the model, in line with those that might be expected, given the slow adjustment that usually characterises the behaviour of this market.

4. CONCLUSIONS

The analysis of the price of housing in Spain in this article (based on the results obtained from the models and methodologies used in Martínez and Maza (2003) and Ayuso and Restoy (2003)) suggests that this asset was somewhat undervalued in the second half of the 1990s, owing to an excessive correction (in real terms) of its value from 1991. This undervaluation has, however, been more than offset by the strong growth towards the end of the decade, so that in 2002, when the sample ends, prices were above their long-term equilibrium level.

The magnitude of the overvaluation, depending on the approach and model considered, is between 8% and 20%.

The behaviour of the price of this real asset, with its fluctuations and strong inertia, is not without precedent in the Spanish economy or, indeed, in the history of other developed countries. In fact, in accordance with the estimated models, the recent developments in house prices in Spain and the resulting overvaluation are, generally, compatible with the usual dynamics of adjustment in this market. In consequence, and subject to the caveats that should accompany exercises like the ones carried out, a reduction may be expected in the rate of growth of this price towards levels more in line with the trends in the long-term fundamentals. However, obviously, the longer this convergence is put off the greater will be the risk that the necessary adjustment ends up occurring more rapidly than is desirable.

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